

RuleDesk™ – A Revolutionary Tool for Customizing Your Approach to Machinery Management

Bently Nevada's new RuleDesk™ plug-in adds significant new power to our Machine Condition Manager™ 2000 software package (MCM2000). With the addition of RuleDesk™ capabilities, you can now create complex, custom machine diagnostic rules via an easy-to-use graphical interface. No special programming skills are required and rule creation is as simple as drawing a block diagram on the screen.

What Is MCM2000?

MCM2000 software is a knowledge-based system that continuously audits underlying databases from Data Manager® 2000 and Bently PERFORMANCE™ systems to provide intelligent advisories regarding machine conditions. The user is freed from “plot surfing” these underlying systems to look for machinery problems and can be alerted to developing machinery problems faster. In addition, user-specific, intelligent advisories are provided when a machine or process problem is found. Until the addition of RuleDesk™, the advisories provided by MCM2000 could be easily customized, but not the identified machinery malfunctions themselves – the user was constrained to only those that could be identified by our default knowledge base/rule set. RuleDesk™ was developed to overcome this, providing a level of flexibility and ease-of-use that is unsurpassed.

What Can You Do with RuleDesk™?

RuleDesk™ allows you to embed knowledge of machinery behavior and its interaction with other machines/process conditions into the machinery management software. This provides a host of variable-dependent actions and reactions that are totally configurable by the user.



The simplest way to appreciate the power and ease-of-use provided by RuleDesk™ is to actually build a rule. By following along below, we'll show you in six steps just how easy it is to use this powerful new enhancement to MCM2000 software.

Building Rules – An Example

Assume we're monitoring a large, 500 MW steam turbine generator with a history of shaft crack problems, and that our underlying Data Manager® 2000 database has access to generator MVar, MW, and Condenser Vacuum Pressure values. It is well known that acceptance region monitoring is a very effective way to obtain early warning of a developing shaft crack. Also assume that this machine's acceptance region – the region of “normal” 1X amplitude and phase (i.e., 1X vectors) – is a function of the variables above: MVar, MW, and Condenser Vacuum Pressure.

Using this example, we'll illustrate how easy it is to create an “adaptive” acceptance region using RuleDesk™.

Step 1:

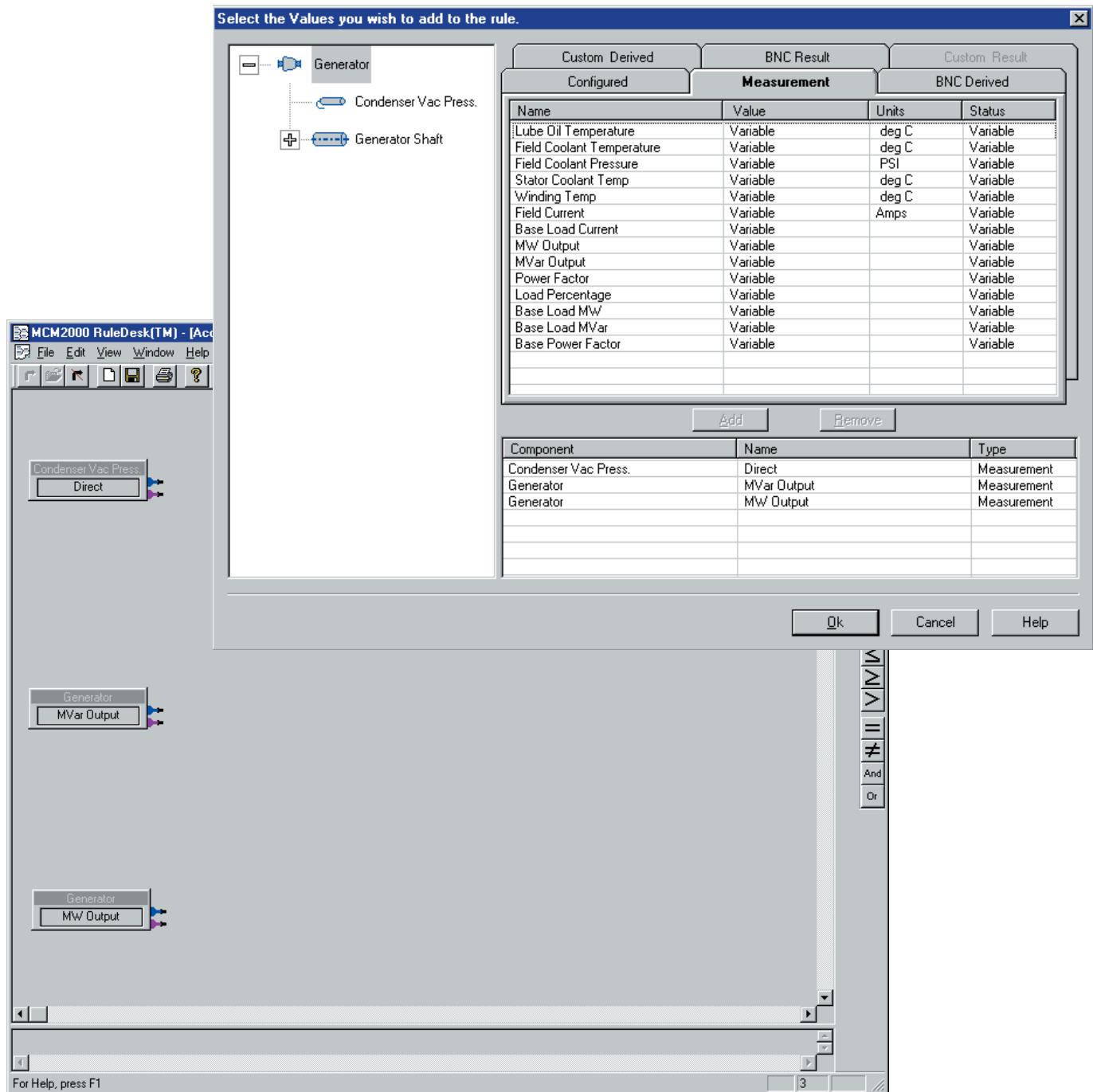
Simply write your rule down on a piece of paper. Use whatever format you prefer: block diagram, equation, etc., as long as you understand it and can later translate it into a format understood by RuleDesk™. In our case, here is the rule:

- IF MW is between 80% and 100% of design value (500 MW)
- AND MVar is between 80% and 100% of design value (70 MVar)
- AND condenser vacuum pressure is between 80% and 100% of design value (1.0 psia)
- THEN use acceptance region #1.
- OTHERWISE use acceptance region #2.

For purposes of this example, we'll assume that acceptance regions #1 and #2 have already been defined and established within RuleDesk™, and this machine's normal 1X vectors always fit neatly into two distinct acceptance regions based on various combinations of MW, MVar, and Condenser Vacuum Pressure. While this

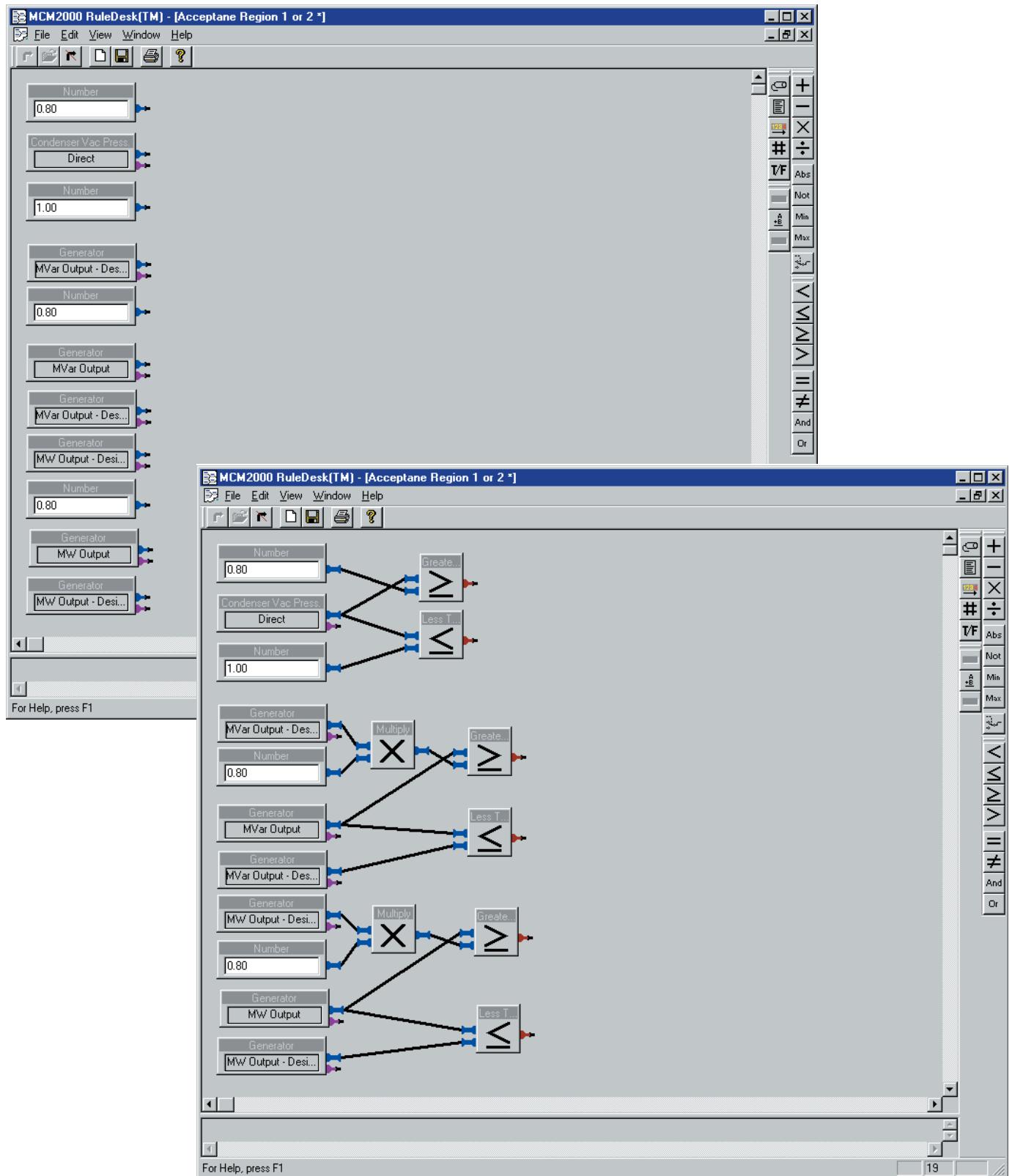
is overly simplified, it will serve for illustration purposes. In practice, limits for multiple acceptance regions would be determined by examining trends of 1X amplitude and phase as they relate to changes in the aforementioned variables.

Step 2: Select your variables (MW, MVar, Condenser Vacuum Pressure) and click ok ...



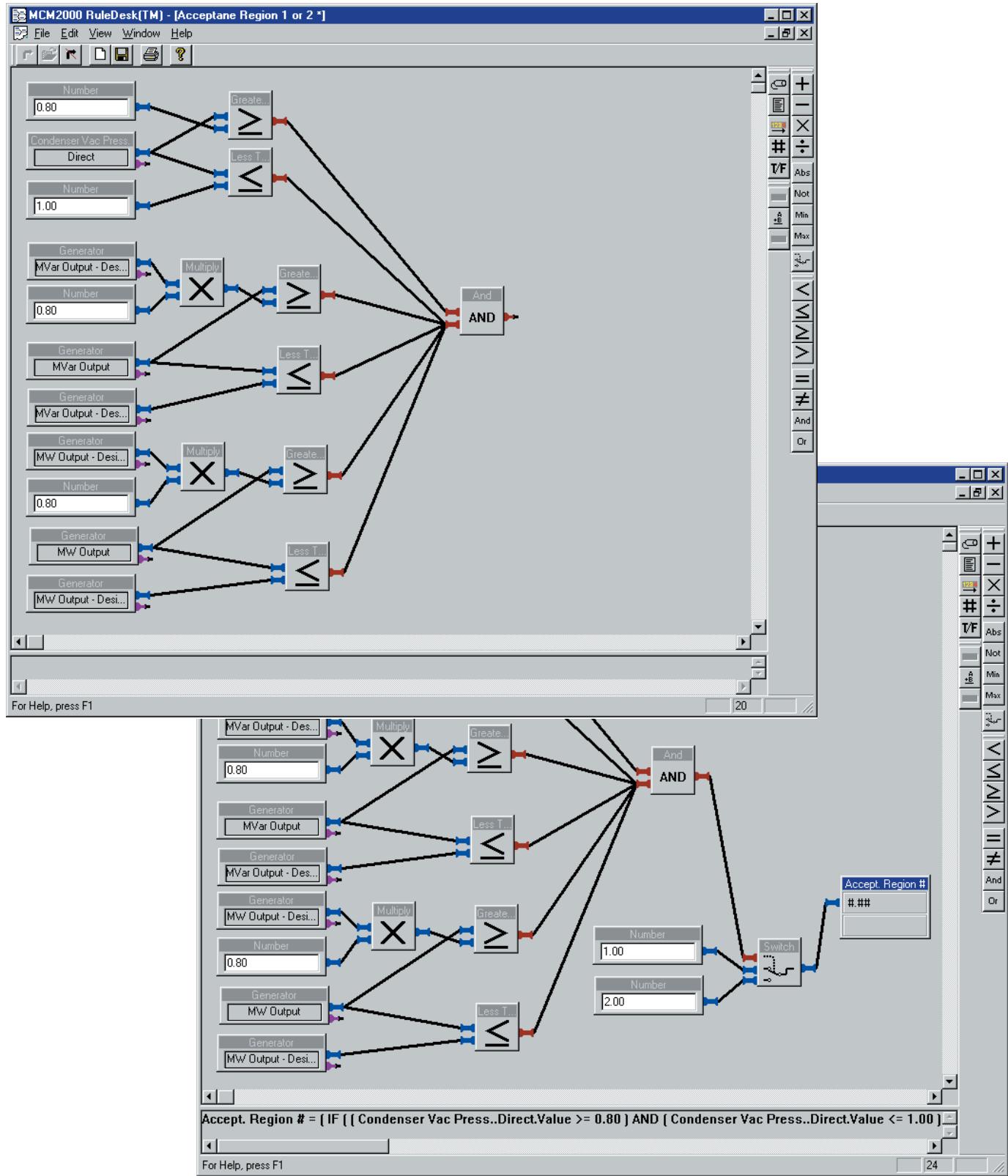
... the input variables show up in the rule creation desktop.

Step 3: Add the upper and lower values to which input variables will be compared.



Step 4: Add the appropriate operators (+, -, ×, >, <, etc.) to connect the inputs. Drag from the toolbar on the right, then connect with lines by clicking on output and input nodes.

Step 5: Drag an AND operator onto the desktop from the right-hand toolbar and connect all the conditional statement outputs to the AND operator inputs.



Step 6: Connect AND operator to switch for acceptance region selection (1 or 2). Your new rule is now done!

More Rules

Once we've defined an adaptive acceptance region for 1X amplitude and phase, we could create a similar rule to deal with 2X amplitude and phase, since this too is an important vector to monitor for shaft crack and whose "normal" region can vary with machine loading. Likewise, we could create a significantly more complex rule that provided more than two acceptance regions based on various combinations of MW, MVar, and Condenser Vacuum Pressure conditions. The beauty of RuleDesk™ is that what you can do with it is totally up to you. Acceptance regions based on plant-specific and operating-specific conditions is just one example – thousands more exist.

Conclusion

As we've shown, creating new rules to customize your MCM2000 software's capabilities is extremely simple. This powerful new enhancement opens new opportunities for managing your machinery more effectively and in a way that is totally tailored to your specific machines, operating conditions, and procedures. Talk to your local Bently Nevada sales or service professional today for additional information about the value of using knowledge-based capabilities as part of your machinery asset management strategy, and for more information about the capabilities of MCM2000 with RuleDesk™. ☺